INVESTIGATION OF ROLE OF SURGIGEL IN PREVENTION OF INTRA OPERATIVE AND POST OPERATIVE BLEEDING IN PROSTATECTOMY

THESIS

FOR

MASTER OF SURGERY

(GENERAL SURGERY)

BUNDELKHAND UNIVERSITY
JHANSI (U. P.)

1989 AMAR SINGH

DEPARTMENT OF SURGERY
M.L.B. MEDICAL COLLEGE,
JHANSI (U.P.), INDIA

C E R T I F I C A T E

This is to certify that Dr. Amar Singh has worked on the topic " INVESTIGATION OF ROLE OF SURGICEL IN PREVENTION OF INTRA OPERATIVE AND POST OPERATIVE BLEEDING IN PROSTATECTOMY", under my guidence and supervision. His results and observations have been checked and verified by me from time to time.

He has put in the necessary stay in the department of surgery as per university regulations.

(S. L. AGARWAL)
M.S., F.R.C.S.
Professor & Head,
Department of Surgery,
M.L.B. Medical College,
Jhansi (U.P.), India.

(GUIDE)

DEPARTMENT OF ANAESTHESIOLOGY
M.L.B. MEDICAL COLLEGE,
JHANSI (U.P.), INDIA

C E R T I F I C A T E

This is to certify that Dr. Amar Singh has worked on the topic " INVESTIGATION OF ROLE OF SURGICEL IN PREVENTION OF INTRA OPERATIVE AND POST OPERATIVE BLEEDING IN PROSTATECTOMY", under my guidence and supervision. His results and observations have been checked and verified by me from time to time.

18/2/89

(U. C. SHARMA)
M.D., D.A.
Professor and Head,
Department of Anaesthesiology,
M.L.B. Medical College, Jhansi.

(CO-GUIDE)

DEPARTMENT OF BIOCHEMISTRY
M.L.B. MEDICAL COLLEGE
JHANSI (U.P.), INDIA.

C E R T I F I C A T E

This is to certify that Dr. Amar Singh has worked on the topic " INVESTIGATION OF ROLE OF SURGICEL IN PREVENTION OF INTRA OPERATIVE AND POST OPERATIVE BLEEDING IN PROSTATECTOMY", under my guidence and supervisions. His results and observations have been checked and verified by me from time to time.

S. P. Singh

(S. P. SINGH)
M.Sc., Ph.D.
Reader & Head,
Department of Biochemistry,
M.L.B. Medical College,
Jhansi (U.P.), India.

(CO-GUIDE)

A C K N O W L E D G E M E N T S

It is a matter of great pleasure for me to have worked under the able guidence of my respected Professor S. L. Agarwal, M.S., F.R.C.S., Head of department of Surgery, M. L. B. Medical College, Jhansi. His able guidence, valuable suggestions and meticulous attention towards my present study was inevitable for the success of this work. I express my indebtness and reverance to my respected professor.

I am equally indebted to Professor U.C.Sharma M.D., D.A., Head of department of Anaesthesiology, M.L.B. Medical College, Jhansi and Dr. S.P.Singh, M.Sc., Ph.D., Reader & Head of department of Biochemistry of M.L.B. Medical College, Jhansi for their constant help and expert guidence which was inevitable in carrying out the present study. My sincere regards to them.

I am highly thankful to my respected teachers of the department of Surgery, Dr.R.P.Kala, M.S., Dr. Mohan Singh, M.S., Dr. D.Pratap, M.S., Dr. Rajeev Sinha, M.S. for their valuable suggestion and guidence. My due regards to them.

My thanks are due, to Dr. Uday Kumar Jain, M.S. Pool Officer, department of Surgery and Mr. Anil Kumar Gupta, Demonstrator, Department of Biochemistry for his co-operation and suggestions at various stages of my work.

I also pay my thanks to Dr. P.J.S.Chawla for helping me in carrying out my work.

I am very thankful to Mr. B.P.Tiwari for typing this manuscript.

I dedicate this work to my parents and my wife who have beared with me all throughout.

Amar Singh

(AMAR SINGH)

C O N T E N T S

INTRODUCTION

INTRODUCTION

Large amount of blood may be lost from the circulation without changes in such indicies as blood pressure, pulse rate and skin blanching reflexes. This is true not only in the conscious subject (Barcroft 1949) but also to a greater extent when the patient is anaesthetized. As the patient grows older it becomes more and more important to check and replace the volume of fluid lost.

To control excessive bleeding during surgery and post operative period, various methods are adopted. But however undesirable it may be, the loss of blood is a natural consequence of any surgery.

For prostate it is said " When the hair become grey and scanty, when specks of the earthy matter begins to be deposited in the tunics of the artery, and when a white zone is formed at the margins of the cornea, at this same period of life, the prostate gland usually - I might perhaps say invariably - becomes

increased in size (Sir Benjamin Brodie). Benign enlargement of the prostate usually occurs between 60 and 70 years of age.

In old people, it becomes quite essential to minimize the blood loss. In addition, economy in the use of blood transfusion is essential if the growing need for blood is to be met.

To check bleeding during operation various methods have been adopted such as ligation, cautery pressure pack etc. During operation, if the bleeders are easily seen and caught, then there is no problem. But it becomes difficult when the bleeding points are not visualized. In prostatectomy operation the prostatic fossa surface is not visualized properly, hence it becomes difficult to ligate the vessels. If the haemostasis is not maintained then post operative haematuria and clot retention may further aggrevate the problem.

To check bleeding many people do packing which is taken out after 24 hours. Again after taking out pack, there may be haematuria.

Therefore it was decided to use a new surgical haemostatic material - SURGICEL, to check bleeding during prostatectomy operations and compare it with other old haemostatic methods e.g. packing etc.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

To secure haemostasis a number of methods have been adopted such as cautery, ligation and packing etc.

In cautery we apply the cautery on the bleeders and so bleeding immediately stops. In ligation the bleeding points are tied with catgut. For oozing surfaces or minute bleeding pressure application has also advantages.

All these methods require proper exposure. But in prostatectomy it is very difficult to have proper exposure of prostatic fossa. So 'Surgicel' was tried to secure haemostasis.

Though Surgicel is frequently used in neurosurgical operations, in prostatectomy operations it has not been used much as the first choice to secure haemostasis. And very little is known about it's role in this operation.

Surgicel is absorbable hemostat, chemically sterilized. It is absorbable knitted fabric, prepared by the controlled oxidation of regenerated cellulose. The fabric is white with a pale yellow cast and has a faint, caramellike aroma. It is strong and can be sutured.

The mechanism of action whereby Surgicel accelerates clotting is not completely understood. But it appears to be physical effect rather than any alternation of the normal physiologic clotting mechanism. After Surgicel absorbable hemostat has been saturated with blood, it swells into a brownish or black gelatinous mass which aids in the formation of a clot, thereby serving as a hemostatic adjunct in the control of local hemorrhage. Surgicel is absorbed from the site of implantation with practically no tissue reaction. Absorption depends upon several factors, including the amount used, degree of saturation with blood, and the tissue bed.

The hemostatic effect of Surgicel is greater when it is applied dry. Therefore before applying to the bleeding surface blood should be soaked by sponges. Secondly before and after application, saline irrigation of the cavity should be delayed. And in any case it should not be wet before hemostasis has been secured and the Surgicel has adhered to the surface.

After the removal of enlarged prostate gland there is bleeding. Bonica and Lyter (1951) in summerizing the work of other investigators, concluded that blood loss as estimated by the surgeon is always less than actually measured.

To estimate the role of Surgicel, blood lost during the operation and post operative period were measured. There are four methods which have been modified in a number of ways.

Subjective estimation is done by visual assessment by the staff in operation theatre. The

method has advantage as it is inexpensive, rapid and continous method. But the visual assesment by different staff such as Surgeon, anaesthesist and others does not concide and so extremely inaccurate results may be obtained. Brockner J. and Donvig M. (1969) compared the blood loss by subjective estimation method with blood loss measured electrometrically after washing out the blood from the drapes, Swabs and sponges. In 216 adult patients the estimated blood loss was equal to measured value in only 12 cases, in 87 patients the visual estimate was higher than that measured by the other method and in 117 patients it was lower.

Gravimetric Method

In 1942, Wangensteen described this simple method of blood loss by measuring blood soaked sponges. Standard size gauzes are made and their weight is taken and after the operation all the sponges soaked with blood are weighed again. The

difference of two gives the blood loss.

Later Bonica and Lyter (1951) modified this method. The swabs are moistened with a known quantity of saline. The blood measured in suction bottle is added to the increase in sponge weight. This method is based on assumption that 1 ml blood is equivalent to 1 gm.

The discrepancy between the assumed weight and the actual weight is a source of error but a mathematical calculation can be applied to reduce the source of error. The average specific gravity of RBC is 1.0293 and of plasma 1.0270. The total blood loss in millilitres can be measured by dividing the weight of blood loss in gms with the average specific gravity of the blood.

Forsee and Schmidt (1952) showed that reliance on swab weighing results in under replacement of up to 45 percent.

Gardinar, A.J.S. and Dudley, H.A.F. 1962 suggested that there were large inherent errors particularly loss from evaporation, which may be upto 10% in 15 minutes. So swabs should be measured as soon as possible.

But in prostatectomy operation urine or fluids may be soaked or sucked in bottles and this may give wrong results. Secondly bloods loss on to drapes, gowns and on floor is not taken into account which may further give lower results.

Blood loss can be calculated by taking weight of the patient pre operatively and then post operatively. For this a large weighing table can be used. This method is inconvenient because allowance for dressing, dripset, catheter, infusion has to made. Then there is excessive handling of patient. loss of water by respiration, perspiration and evaporation from wound may further be the source of error. Weight of tissue removed is other factor

which must be taken into account.

Ausman et al (1961) showed that weighing the patient is equally unreliable.

Extraction dilution method

Blood can be extracted by various means from the absorptive materials and suction effluent and any constant chemical or physiochemical property used as yardstick for measurement of it's concentration in the resulting solution.

The early results (Gatch and Little, 1924; pilcher and Sheard 1937; White et al, 1938; White and Buxton 1942; Coller Crook and Iob 1944) which were obtained by measuring some derivatives of haemoglobin such as acid haematin were not very accurate because of incomplete recovery.

Le Veen and Rubricius (1958); Klopstock, Le Veen and Levitan (1959) described an extraction dilution or washing method based on electrical conductivity of blood. Addition of blood to water

will produce changes in electrical conductivity of the mixture, which can be measured. Provided other electrolytes are not present, this is an extremely accurate method and has a vitrue of giving satisfactory reading. The concentration of blood in the resulting solution can be continously determined by optical densitometry.

Colorimetric method is based upon the estimation of haemoglobin. Soaked sponges, towels and instruments are washed in 10 litres of water. To which is added sufficient amount of ammonium hydroxide in 1:1000 dilution and defoaming agent (Caprylic alcohol) and blood from suction bottle. Then haemoglobin concentration of the resultant solution is determined colorimetrically and the amount of blood loss is calculated as -

$$\text{Blood loss (ml)} = \frac{\text{Hb(gm dl}^{-1}\text{) washing fluid}}{\text{Hb(gm dl}^{-1}\text{) patient blood}} \times \frac{\text{volume of washing fluid ml.}}{\text{Dilution factor.}}$$

Roe, Gardiner and Dudley (1962) and Thronton and Collaegues (1963) have described simple colorimetric devices.

However this technique has the disadvantage that as the volume of blood added to the system increases, it itself alters the volume of the solvent and thus influences the final concentration (A.J.S. Gardiner, H.A.F. Dudley).

MATERIAL AND METHODS

MATERIAL AND METHODS

The study was conducted on the patients admitted in M.L.B. Medical College Hospital, Jhansi fromM March 1988 to Jan. 1989 with symptoms arising due to benign enlargement of prostate and undergoing prostatectomy operation.

After doing per rectal examination, diagnosis was made. The primary investigations such as -

Routine examination of blood, urine, blood urea, Blood Sugar, Bleeding time, coagulation time and ECG were done and noted.

The sponges and gauzes were cut of equal sizes and weighed to make procedure simple and were sterlized after marking.

Height of the patient was taken in centimeters and weight taken in kilograms before transferring the patients to the operation table. Obesity was assesed by - Standard height weight chart.

Bleeding time was measured in minutes by the ear lobule skin prick method using a blotting paper andclotting time measured in minutes by the glass capillary method.

The patients, undergoing operation were divided in two groups.

i) Group A

ii)Group B

Pre operative blood was taken out to determine haemoglobin concentration by colorimeter.

All operations were done under spinal anaesthesia. And in every case Freyer's method of prostectomy was done.

Group A - In patients of group A the usual methods were tried and patients were divided into 3 sets, depending upon the method for haemostasis.

1) Ist set ligation method

2) IInd set - Cautery

3) IIIrd set - Packing

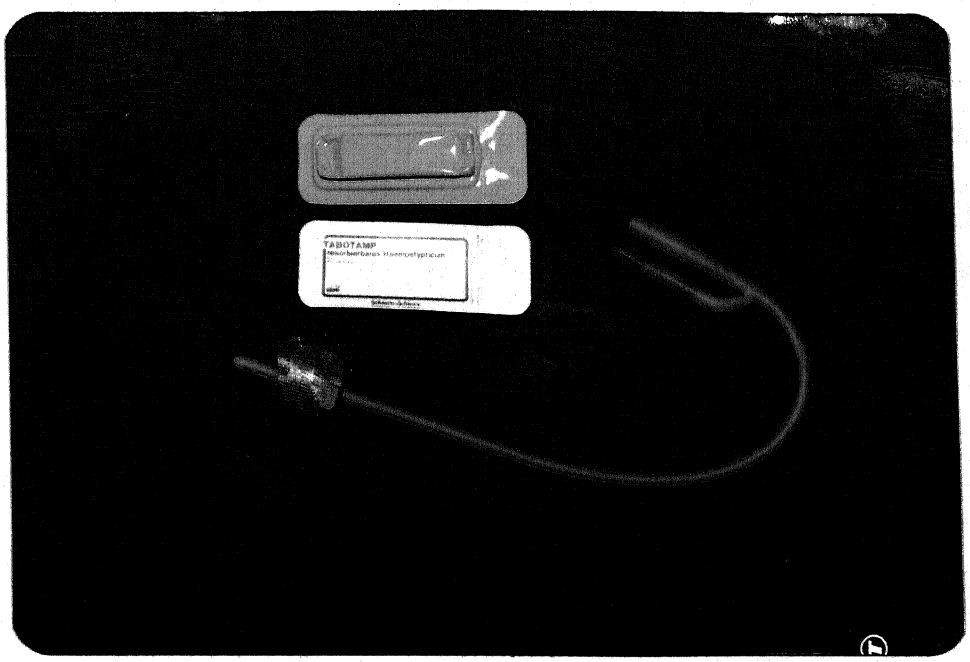
After incising skin and opening the bladder, prostate gland was taken out.

In Ist set after taking out the gland, blood was soaked by standard sponges. The weight of sponges to be used for soaking was already noted. Then the bleeding surface was ligated and watched for any bleeding. If bleeding was controlled then catheter was passed and the Foley's baloon was inflated. Any blood in the bladder was sucked. The bladder was then closed after inserting Malecot catheter for doing continous irrigation. The sponges were weighed and the blood in suction was measured.

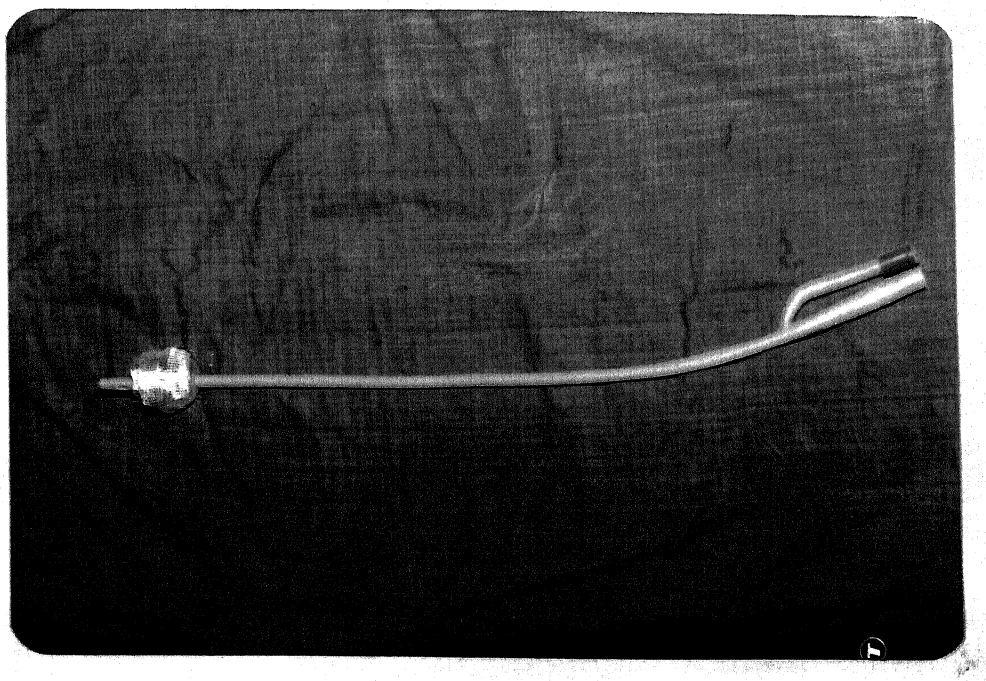
In second set, bladder was opened by the same method and cautery was used for securing haemostasis after removing prostate gland. The sponges were measured pre operatively and post operatively. The bladder was closed after inserting the Foley's catheter and Malecot catheter for continous irrigation, and the blood loss was measured by weighing

PHOTOGRAPH SHOWING PRE OPERATIVE SPONGES (UNSOAKED) WITH WEIGHING MACHINE.

PHOTOGRAPH SHOWING PROSTATECTOMY OPERATION.



PHOTOGRAPH SHOWING SURGICEL AND FOLEY'S CATHETER.



PHOTOGRAPH SHOWING SURGICEL APPLIED ALL ROUND THE INFLATED FOLEY'S BULB.

PHOTOGRAPH SHOWING POST OPERATIVE BLOOD SOAKED SPONGES WITH WEIGHING MACHINE.

PHOTOGRAPH SHOWING (L TO R)

- RESULTANT SOLUTION
- POST OPERATIVE BLOOD SAMPLE
- PRE OPERATIVE BLOOD SAMPLE
- CYANMETHHAEMOGLOBIN STANDARD
- COLORIMETER
- DRABKIN'S REAGENT
- BURETTE

soaked sponges and measuring the blood in suction bottle.

In third set, long gauze pack was used as a pack for securing haemostasis after removing prostate gland instead of cautery and ligation. Weight of gauze was noted before packing and after it is taken out blood in suction if any was noted. Sponges used were weighed and the bladder closed after inserting Foley's catheter and malecot catheter. Continous irrigation was then maintained.

Group B - In group B the pre operative haemoglobin was determined by colorimeter method.

Again the bladder was opened in similar manner prostate gland was enucleated. Sponges weighed earlier were used for soaking the blood. Suction was also used Foley's catheter was passed. Then the bulb was inflated with 30 to 40 cc saline.Surgicel was applied around the inflated bulb and catheter was given traction to place the bulb in the prostate fossa.

After waiting for few minutes, so that surgicel gets stuck to prostatic cavity, malecot catheter was inserted. Any blood in the cavity was sucked or removed by soaking with sponges. Then the bladder was closed, and irrigation with normal saline was maintained.

After completing the operation in both the groups again 2 ml blood was taken out by sterilized syringe to determine post operative haemoglobin by colorimeter.

The sponges were weighed and the blood in suction bottle was measured.

SUBJECTIVE METHOD

For subjective estimation bleeding per operatively and post operatively in collecting bag was noted.

GRAVIMETRIC METHOD

Blood loss was calculated by weighing soaked sponges and measuring blood in suction apparatus. Difference of dry and soaked sponges and adding the

volume in suction gives the total blood loss. The blood loss was calculated by dividing the total weight of blood by the average specific gravity of blood.

COLORIMETRIC METHOD

To determine the blood loss by colorimeteric method, a large bucket was taken to which 10 litres of water was added. In that water, all the sponges and towels were washed thoroughly.

Cyanamethhaemoglobin method for estimation of haemoglobin was used. 1.5 ml of filtered resultant solution was added to 6 ml of Drakin's solution in a glass test tube. The optical density of this was taken by photo electric colorimeter and thus the haemoglobin concentration of resultant solution was calculated.

$$\text{Hb concentration of resultant washing solution} = \frac{\text{O.D. of R.S. X Hb Conc.of Standard solution (gm\%) X 4}}{\text{O.D. of standard solution.}}$$

Pre operative and post operative haemoglobin concentration of the patient was also determined by

Cyanmethhaemoglobin method .02 ml of patients blood was taken in pipette by finger prick method and mixed to 5 ml of Drakin's solution in a standard glass test tube. Optical density was determined by photo electric colorimeter and thus Haemoglobin concentration of patients blood pre operatively and post operatively was determined by -

$$\text{Hb Concentration of patient blood} = \frac{\text{O.D. of Sample} \times \text{Hb Conc. of standard solution} \times 251}{\text{O.D. of standard solution.}}$$

$$\text{Average Hb Conc. of patient blood} = \frac{(\text{Hpre} + \text{Hpost})}{2} \text{ gm\%}$$

When, Hpre = pre operative Hb concentration

Hpost= post operative Hb concentration

$$\text{Final Vol. of resultant solution} = \text{Initial volume of solution} + \text{Blood lost added to solution}$$

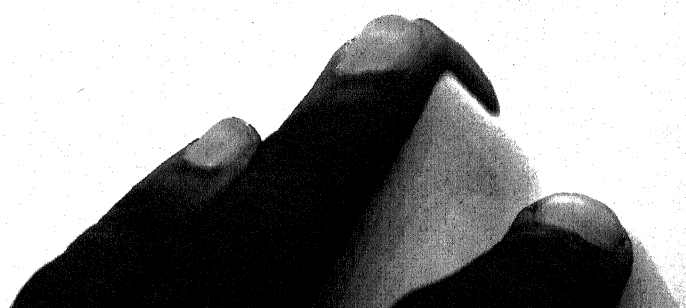
$$\text{Blood lost (ml)} = \frac{\text{Hb Conc. of R.S.} \times (\text{Vol. of washing water} + \text{Vol. of blood lost added to solution})}{\text{Average Hb concentration of patient's blood (gm\%).}}$$

Then post operative normal saline irrigation was maintained in all cases and the fluid was collected in collecting bag.

After the total volume becomes 10 litres, 1.5 ml of the resultant solution is taken and the haemoglobin concentration is determined by the same method.

Again 2 ml of the patient's blood is taken out and the haemoglobin concentration is determined.

And so the blood lost in 48 hours is determined by the same method.



OBSERVATIONS

OBSERVATIONS

The work was done on the patients admitted in M.L.B. Medical College, Jhansi from March, 86 to Jan. 1989.

The patients undergoing prostatectomy were divided into two groups.

1. Group A
2. Group B

Group A

In these patients for stopping bleeding during operation usual method of packing was done in Twenty patients, ligation of bleeders was done in ten patients and cautery in five patients. Blood loss during and after operation was measured by the different methods.

Group B

In this group surgicel was applied in the prostatic fossa. Then the blood loss during and after operation was measured.

TABLE NO. 1

Table showing blood loss during operation and post operative period by colorimetric method when surgicel was used.

Sl. No.	Blood loss during operation (ml)	Blood loss in post operative period (ml)	Total Blood loss (ml)
1.	310	77	387
2.	168	70	238
3.	182	61	243
4.	295	62	357
5.	247	69	316
6.	342	66	408
7.	264	73	337
8.	253	71	324
9.	332	64	396
10.	214	58	272
11.	278	67	345
12.	259	69	328
13.	303	65	368
14.	221	57	278
15.	279	61	340
16.	274	72	346
17.	284	67	351
18.	265	53	318
19.	280	59	339
20.	272	60	332

TABLE NO. 2

Table showing total blood loss during operation and the post operative period by Gravimetric method, when surgicel was used during prostatectomy.

Sl.No.	Total blood loss (ml)
1.	342
2.	264
3.	259
4.	318
5.	343
6.	386
7.	394
8.	298
9.	361
10.	298
11.	313
12.	301
13.	329
14.	305
15.	304
16.	313
17.	319
18.	343
19.	298
20.	309

TABLE NO. 3

Table showing blood loss during operation and post operative period by colorimeteric method when packing was done.

Sl. No.	Blood loss during operation (ml)	Blood loss in post operative period (ml)	Total Blood loss (ml)
1.	251	98	349
2.	292	122	414
3.	214	62	276
4.	287	86	373
5.	197	72	269
6.	260	78	338
7.	260	86	346
8.	292	67	359
9.	193	59	252
10.	358	136	494
11.	328	118	446
12.	262	79	341
13.	286	96	382
14.	289	71	360
15.	330	62	392
16.	291	64	355
17.	307	58	365
18.	197	61	258
19.	271	76	347
20.	269	82	351

TABLE NO. 4

Table showing total blood loss during operation and post operative period by gravimetric method when packing was done during prostatectomy.

Sl.No.	Total Blood loss (ml)
1.	309
2.	382
3.	291
4.	341
5.	286
6.	343
7.	319
8.	309
9.	261
10.	466
11.	413
12.	309
13.	346
14.	352
15.	378
16.	341
17.	339
18.	272
19.	305
20.	336

TABLE NO. 5

Table showing blood loss during operation and post operative period by colorimetric method, when ligation was done during prostatectomy.

Sl. No.	Blood loss during operation (ml)	Blood loss in post operative period (ml)	Total Blood loss (ml)
1.	316	70	386
2.	372	76	448
3.	350	356	706
4.	405	364	769
5.	390	358	748
6.	398	88	486
7.	350	68	418
8.	428	92	520
9.	331	63	394
10.	362	67	429

TABLE NO. 6

Table showing total blood loss by Gramimetric method, when ligation was done during prostatectomy.

Sl. No.	Total blood loss (ml)
1.	369
2.	402
3.	689
4.	618
5.	712
6.	438
7.	425
8.	498
9.	412
10.	402

TABLE NO. 7

Table showing blood loss by Colorimetric method, when cautery was used during prostatectomy.

Sl. No.	Blood loss during operation (ml)	Blood loss in post operative period (ml)	Total Blood loss (ml)
1.	346	100	446
2.	284	60	344
3.	396	184	580
4.	412	166	578
5.	384	82	466

TABLE NO. 8

Table showing total blood loss by Gravimetric method, when cautery was used during prostatectomy.

Sl.No.	Total Blood loss (ml)
1.	412
2.	359
3.	545
4.	538
5.	441

It was observed that blood loss was minimum with surgicel and maximum with ligation method.

The average blood loss with surgicel was 331 ml, with packing 353 ml with ligation 530 ml, with cautery 482 ml by Colorimetric method.

TABLE NO. 9

Table showing average blood loss when the different methods were used - By Colorimetric method during prostatectomy.

Procedure	Total Blood loss (ml)
Surgicel	331
Packing	353
Ligation	530
Cautery	482

The average blood loss with surgicel was 315 ml, with packing 335 ml with ligation 496 ml with cautery 459 ml by Gravimetric method.

TABLE NO. 10

Table showing average blood loss when the different methods were used by Gravimetric method during prostatectomy.

Procedure	Total Blood loss (ml)
Surgicel	315
Packing	335
Ligation	496
Cautery	459

The minimum amount of total blood loss in an individual prostatectomy was 238 ml with surgicel method and maximum 769 ml with ligation method, when calculated by Colorimetric method.

TABLE NO. 11

Table showing range of total blood loss by different procedures by Colorimetric method during prostatectomy.

Procedure	Range of total blood loss (ml)
Surgicel	238 - 408
Packing	252 - 494
Ligation	386 - 769
Cautery	344 - 580

The minimum amount of total blood loss in an individual prostatectomy was 259 ml with surgicel method and maximum 712 ml with ligation method, when calculated by Gravimetric method.

TABLE NO. 12

Table showing range of total blood loss by different procedures by Gravimetric method during prostatectomy.

Procedure	Range of total blood loss (ml)
Surgicel	259 - 386
Packing	261 - 466
Ligation	369 - 712
Cautery	359 - 545

There was not much difference in average blood loss during operation between surgicel and packing method. But in ligation and cautery method average blood loss during operation was much more.

TABLE NO. 13

Table showing average blood loss during operation by colorimetric method when different methods were adopted during prostatectomy.

Method	Average blood loss (ml)
Surgicel	266
Packing	272
Ligation	370
Cautery	364

Minimum blood loss during operation in any individual prostatectomy was with surgicel method 168 ml and maximum with ligation method 428 ml.

TABLE NO. 14

Table showing range of blood loss during operation by colorimetric method when different methods were adopted during prostatectomy.

Method	Range of blood loss (ml)
Surgicel	168 - 342
Packing	193 - 358
Ligation	316 - 428
Cautery	284 - 412

In the post operative period average blood loss was minimum with Surgicel method and maximum with ligation method.

TABLE NO. 15

Table showing average blood loss during post operative period by colorimetric method when different methods were adopted during prostatectomy.

Method	Average blood loss (ml)
Surgicel	65
Packing	81
Ligation	161
Cautery	118

The minimum amount of blood loss in post operative period in an individual prostatectomy was 53 ml with surgicel method and maximum 364 ml with ligation method.

TABLE NO. 16

Table showing range of blood loss during post operative period by colorimetric method when different methods were adopted during prostatectomy.

Methods	Range of blood loss (ml)
Surgicel	53 - 77
Packing	58 - 136
Ligation	70 - 364
Cautery	60 - 184

It was observed that once haemostasis has been secured by Surgicel method, then there is no chances of secondary haemorrhage, where as in packing method there may be excessive bleeding after removal of pack.

-

DISCUSSION

DISCUSSION

Benign enlargement of prostate is a disease of old age. In old age patient, it is essential to minimise bleeding. Bleeders if seen properly can be easily ligated or cauterized.

But in prostatectomy the bleeding points are not visualized. Hence it is difficult to ligate or cauterize them. Off the three methods of haemostasis in prostatectomy e.g. ligation, cautery and packing the most popular method is packing, where after removal of prostate gland Foley's catheter is passed and then the prostatic cavity is packed with long gauze. The pressure exerted by the gauze and the inflated bulb of the Foley's catheter helps to check the bleeding.

To remove this pack the other end is taken out through the main wound or separate incision on the lateral side of the main wound. The pack is

removed after twenty four hours or when bleeding has stopped. After the pack is removed there is increase in quantity of bleeding for some time. In some cases there are chances of secondary haemorrhage after removal of the pack.

In this series, there was secondary haemorrhage in two cases after pack was removed. In all the operations the post operative blood loss was below 100 ml, except in three cases where there was secondary haemorrhage after the removal of the pack.

In this series, a new method of haemostasis i.e. lining the prostatic fossa with surgicel was tried. It was observed that in surgicel and packing methods, there was not much difference in the loss of blood during operation and in post operative period but blood loss by ligation or cautery methods is much more during operation and in the post operative period.

In cases of ligation and cautery, there was lack of proper visualization. Also the bleeding from

the cavity makes these methods more difficult. Secondly it takes longer duration to ligate the bleeders. Hence bleeding during operation was much more. Complete haemostasis was not secured by these two methods hence post operative bleeding was also more than the other methods.

When the bladder is closed in packing method every precaution is to be taken, that the gauze is not taken in the bite. If stiched, it may create problem when gauze has to be taken out. No such precaution has to be taken with surgical method. The eye of Foley's catheter or malecot catheter may some times get blocked by the gauze in the packing method. In packing method, the gauze gets adhered to prostatic fossa wall. It is painfull to the patient when removed. In surgical method there is no such pain. There is also chances of leakage of urine through the wound through which gauze is taken out. Surgicel application was done on twenty patients. In this method after

removal of the enlarged prostate gland, operative field was completely dried by sponges. Then the Foley's was inflated with 20 cc. saline and surgicel was applied all around over the bulb. Then the Foley's catheter was placed in the prostate fossa by pulling out the catheter. Before pulling out once again the fossa was dried up with sponges or suction. Then again the bulb was inflated with 20 cc. of fluid.

It was seen that after sometime there is very little oozing from the fossa and good haemostasis is secured.

Only precaution to be taken is that fossa should be kept dried till the surgicel gets stuck to the fossa wall. Surgicel is absorbed rapidly and completely hence there is no problem. Bleeding stops to a great extent within a minute of applying surgicel to prostatic wall. It shows that surgicel is absorbed quickly from the surface. This may be the reason why there is least bleeding during operation.

In the 20 cases of prostatectomy where surgicel was applied, the average blood loss was far less than ligation and cautery. Though average blood loss and the post operative blood loss was less than packing method but there was not much significant difference.

In cases of ligation and cautery there was excessive blood loss in most patients. And so, Amino Caproic Acid injections were added in drip, six hourly for twenty four hours. After that tablets of same compound were given for two days orally. This caused stoppage of bleeding.

In two patients where packing was done there was supra pubic leakage and so stitches were removed on the tenth day. Tight strapping was done for 3-4 days. Then the patients was discharged on 14th day.

In patients, where ligation or cautery was done three patients of ligation group and two of

cautery group were transfused one bottle of blood.

It was also seen that the patients in these groups were discharged on 14th day or 15th day, because loss of blood was more and so they take time to recoup from operation fully.

It was seen that in hypertensive patients blood loss was more than normal blood pressure patients, belonging to either group.

CONCLUSION

CONCLUSIONS

'Surgicel' method is better for prostatectomy operation, than packing or cauterization of bleeders.

Blood loss by surgicel method is always less than the other methods such as packing, ligation or cautery.

There is no complication with surgicel method during or after the operations where as others do have.

Surgicel is absorbed quickly and completely. Surgicel is easier to apply, takes less time than other methods.

Patient stay in hospital is minimum which is great advantage.

Blood loss is minimal so no transfusion is required.

Post operative loss is also less nor there is any chances of secondary haemorrhage. So no addi-

tional drugs to stop, bleeding is required.

The only drawback is that owing to it's high cost, poor patients can't afford it.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Baronofsky, I.D., Treloar and Wangensteen, O.H. (1946). Blood loss in operation - a statistical comparision of losses as determined by Gravimetric and Colorimetric method. Surgery 20,761.

2. Bonica, J.J. and Lyter, C.S. (1951). Measurement of blood loss during surgicel operation. Amer. J. 81, 496-502.

3. Brockner, J. Donvig, M. (1969). Blood volume measurements before and after operation and determination of operative blood loss. Acta Anaesthesiol Scand, 13, 29.

4. Bond, A.G.(1969). Determination of operative blood loss (the sources of error and elemination of in accuracy in the hemoglobin - cilution technique). Anaesthesia, 24, 219-229.

5. Bourke, D.L.; Smith, T.C. (1974). Estimating allowable hemodilution. Anaesthesiology 41, 609-612.

6. Gardiner, A.J.S. and Dudley, H.A.F. (1962). The measurement of blood loss at operation. Brit. J. Anaesth. 34, 653.

7. Gardiner, A.J.S. and Dudley, H.A.F. (1963) Blood loss in General Surgicel patients. Lancet 2, 859.

8. Gatch, W.D. and Little, W.D. (1924). Amount of blood lost during some of more common operations. J.A.M.A. 83, 1075.

9. Canceres, E. and Whittembury, G. (1959). Evaluation of blood losses during surgical operations, comparision of Gramimetric method with the blood volume determination. Surgery 45, 681-687.

10. Gouin, F., Dessemond, Benoit (1978). Evaluation of peroperative blood loss. Anaes. Analg. (Paris), 35 (5), 968-876.

11. Roe, C.F., Gardiner, A.J.S. and Dudley, H.A.F. (1962). A simple instrument for rapid continuous determination of operative blood loss. Lancet, 1, 672-673.

12. Thronton, J.A., Saynor, R., Schroeder, H.G., Taylor, D.G. and Verel, D. (1963). Estimation of blood loss with particular reference to cardiac surgery. Brit. J. Anaesth., 35, 91.

13. Text Book of Campbell's Urology.